

Notice of Allowability

Application No.

10/601,055

Applicant(s)

ZHANG ET AL.

Examiner

Art Unit

Brian T. Pendleton

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to new application on 6/20/03.
2. ☒ The allowed claim(s) is/are 1-23.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

Allowable Subject Matter

Claims 1-23 are allowed.

The following is an examiner's statement of reasons for allowance:

Brennan et al, US Patent Application Publication 2003/0063759, teach a directional audio signal processing apparatus comprising a plurality of microphones 100, beamformer 710, voice activity detector 450, and post filtering unit 435 in figure 7. Brennan et al thus teach at least one voice activity detector, a beamformer, and a multichannel noise suppressor (post filtering unit 435). While there is disclosed a voice activity detector that provides first and second detection signals based on a plurality of received signals, the beamformer 710 generates a beam-formed signal based on only one of the detection signals. Independent claim 1 requires that the beamformer ("means for providing a beam-formed signal" or "providing a beam-formed signal" as in independent claims 20 and 22, respectively) provide a beam-formed signal based on a second detection signal as well as a reference signal, and a second set of received signals. Brennan et al do not teach nor suggest a reference signal generator for generating the reference signal or a second set of received signals.

Krasny et al, US Patent 6,937,980, disclose a speech recognition unit using a microphone array comprising microphone array 30, beamforming unit 42, and adaptive noise cancellation filter 50. Although there is disclosed a voice activity detector 46 that provides first and second voice detection signals, the beamforming unit 42 does not generate a beam-formed signal based on the output of the voice activity detector 46. In fact, the voice activity detector 46 generates outputs from the beamforming unit 46.

Krasny et al, US Patent Application Publication 2003/027600 discloses a microphone array using voice activity detection comprising beamformer 62, voice activity detector 64, and array filter 54. The voice activity detector 64 only provides one voice detection signal.

Kanazawa et al, US Patent 6,339,758, discloses a noise suppressing method and apparatus comprising a microphone array for inputting channel 1 and channel 2 signals (element 11), beamformers 13 and 16, at least one voice activity detector (speech direction estimating section 18 and noise direction estimating section 17), and a multichannel noise suppressor 30 in the various figures. Thus, Kanazawa et al teach at least one voice activity detector which provides first and second voice detection signals, beamformer 13 for generating a beam-formed signal having a mostly voice component, a reference generator (beamformer 16) for generating a reference signal having mostly a noise component, and a noise suppressor 30. Interpreted reasonably in the broadest sense, Kanazawa also discloses that the reference generator (beamformer 16) provides the reference signal based on a first set of received signals selected from among the plurality of received signals and that the beamformer (beamformer 13) provides a beam-formed signal based on a second set of received signals selected from among the plurality of received signals, as the first set of received signals and second set of received signals are equivalent, in the case in Kanazawa et al. Nonetheless, Kanazawa does not disclose nor suggest that the plurality of microphones include at least one omnidirectional microphone and at least one uni-directional microphone, as required by claims 1, 20, and 22. The directional microphone is lacking.

As result of independent claims 1, 20, and 22 are their dependents, claims 2-19, 21, and 23 are allowed.

Art Unit: 2615

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian T. Pendleton whose telephone number is (571) 272-7527. The examiner can normally be reached on M-F 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brian T. Pendleton
Primary Examiner
Art Unit 2615



btp